BARBEQUE WITH AIR VENTILATION SYSTEM

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Thesis submitted in fulfilment of the requirements
for the award of the degree of
Bachelor of Engineering Technology in Manufacturing

Faculty of Engineering Technology
UNIVERSITI MALAYSIA PAHANG

DECEMBER 2018

STATEMENT OF AWARD FOR DEGREE

1. Bachelor of Engineering Technology

Thesis submitted in fulfilmentof the requirements for the award of the degree of Bachelor of Engineering Technology in Manufacturing

SUPERVISOR'S DECLARATION

We hereby declare that we have checked this thesis and in our opinion, this thesis is adequate in terms of scope and quality for the award of degree of Bachelor of Engineering Technology in Electrical.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries in which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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ACKNOWLEDGEMENTS

I am sincerely grateful to ALLAH “S.W.T” for giving me wisdom, strength, patience and assistance to complete my project work. Had it not been due to His will and favour, the completion of this study would not have been achievable.

This dissertation would not have been possible without the guidance and the help of several individuals who contributed and extended their valuable assistance in the preparation and the completion of this study. I am deeply indebted to my supervisor, Dr Nadzirah Mokhtar for his patient, guidance, comment ,stimulating suggestions and encouragement which helped me in all the time of research, writing of this thesis and assistant throughout my project work.

My sincere thanks go to all lecturers and members of the staff of the Engineering Technology Department, UMP, who helped me in many ways and made my education journey at UMP pleasant and unforgettable. Many thanks go to member group for their excellent co-operation, inspirations and supports during this study. This four year experience with all you guys will be remembered as important memory for me to face the new chapter of life as an engineer.

Especially, I would also like to address my unlimited thanks to my family for their unconditional support, both financially and emotionally throughout my studies. My deepest gratitude goes to my family for their support, patience, love and trust during my study. To my children, Ameena and Al Ameen, hopefully this thesis will be an inspiration to all of you. Finally, I would like to thank everyone who had involved in this study either directly or indirectly.

I acknowledge my sincere indebtedness and gratitude to my parents for their love, dream and sacrifice throughout my life. I am really thankful for their sacrifice, patience, and understanding that were inevitable to make this work possible. Their sacrifice had inspired me from the day I learned how to read and write until what I have become now. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dreams.

ABSTRACT

Nearly half of the world's human population used barbeque for party or gathering with family or friends. This thesis aspires to have a conventional and altenative source of the baqberque with ventilation system.The problem of the thesis was to research about the time of barbeque produce products. Identify good quality charcoal and reduce negative effect towards environment and human health. The main objective was to segment to improve the heat transfer performance of conventional charcoal because if heat directly touch to charcoal Animal testing has shown exposure to high levels of chemicals such as these is linked with cancer, Combusting wood, gas, or charcoal emits chemicals known as Polycyclic Aromatic Hydrocarbons. To design a portable charcoal barbeque set with air ventilation system. The material we use is zinc. stainless steel, blower, battery and hot rack. Designing was started by drawing a few designs using NX10 software. After run an analysis on those design and once a desired design was selected, then fabrication are started. Fabrication flow starts with a material selection were a material used was stainless steel. Then the material was cut into desired measurement. Those pieces are then welded togetger by using MIG welding machine. Machine setting parameter will be0 explained on chapter 3 methodology. The final part of this fabrication was finishing part. The structure painted so that it would be not rusted and in order to have structure with better looks.

ABSTRAK

Hampir separuh daripada populasi manusia dunia menggunakan barbeku untuk pesta atau berkumpul dengan keluarga atau rakan-rakan. Tesis ini bercita-cita untuk mempunyai sumber konvensional dan altenatif baqberque dengan sistem pengalihudaraan. Masalah tesis ini adalah untuk meneliti masa barbeque menghasilkan produk. Kenal pasti arang berkualiti dan mengurangkan kesan negatif terhadap alam sekitar dan kesihatan manusia. Objektif utama adalah untuk segmen meningkatkan prestasi pemindahan haba arang konvensional kerana jika haba secara langsung menyentuh arang ujian haiwan telah menunjukkan pendedahan kepada bahan kimia yang tinggi seperti ini dikaitkan dengan kanser, kayu, gas, atau arang memancarkan bahan kimia yang diketahui sebagai polycyclic aromatic hydrocarbons. Untuk merancang barbeque arang mudah alih yang ditetapkan dengan sistem pengudaraan udara. Bahan yang kami gunakan adalah zink. Keluli tahan karat, peniup udara, bateri dan rak panas. Reka bentuk bermula dengan menarik beberapa rekaan menggunakan perisian nx10. Selepas menjalankan analisis pada reka bentuk tersebut dan sebaik sahaja reka bentuk yang diingini dipilih, maka fabrikasi dimulakan. Aliran fabrikasi bermula dengan pemilihan material adalah bahan yang digunakan adalah keluli tahan karat. Kemudian bahan itu dipotong ke ukuran yang diinginkan. Potongan-potongan tersebut kemudian dikimpal dengan menggunakan mesin kimpalan mig. Parameter penetapan mesin akan dijelaskan pada bab 3 kaedah. Bahagian terakhir dari fabrikasi ini adalah bahagian akhir. Struktur dicat supaya tidak berkarat.

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LIST OF ABBREVIATION

cm	Centimeter
°C	Degree Celsius
g	Gram
kPa	Kilopascal
kV	Kilovolt
L	Liter
MPa	Megapascal
m	Meter
µg	Micro gram
µl	Micro Liter
µm	Micro meter
ml	Milliliter
mm	Millimeter
min	Minute

CHAPTER 1

INTRODUCTION

A barbeque grill is a device that cooks food by applying heat from below. Barbequing over charcoal grills is popular around the world. Every country have their own style of barbequing. It depends on the type of barbeque system. To that end, consumers are able to choose from a various type of charcoal grills that come in all shapes and sizes. Charcoal grills require approximately 30 minutes or more to heat the charcoal to a temperature suitable for safe and effective cooking.

Barbecuing is normally a social occasion and is a safe activity. In Malaysia, under Environmental Quality Act 1974 [Act 127] Environmental Quality (Prescribed Activities) (Open Burning) Order 2000 stated that open burning from outdoor grills, barbeques or fireplaces for the preparation of food which is not carried out at any peat soil area is allowed (Environmental Quality Act 1974 (Act 127), Regulations, Rules & Orders, 2015).

The trend in Figure 1.1 shows barbeque products that increased in sales year over year. Charcoal grill still being used for barbequing purpose. On top of Infrared Grills, Kamados, Gas Grills and Pallet Grills. Thus, in 2014 data show that 15% retailers are still using charcoal/smoker as their barbeque system.

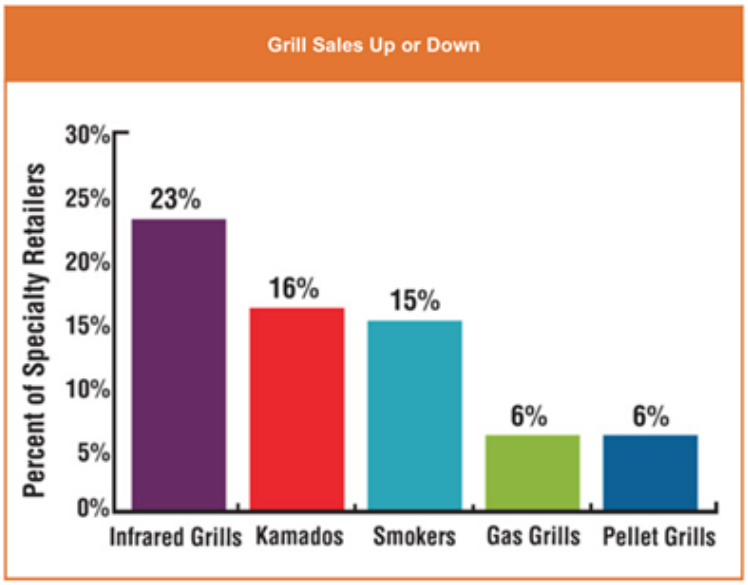

Figure 1.1: The Barbeque Grill Sales in United State 2014 (Wright, 2015)

According to Table 1.1, the amount of shipments for three types of barbeque grills including charcoal, gas and electric from 2010 to 2013. Gas and electric grill shipments were increased while charcoal slightly decreased about 10.3%. People in North US were looking for other method instead of charcoal as they choose not to get expose to the smoke from charcoals. However, charcoal grill cooked meat has better acceptability, tenderness, juiciness, and flavour scores compared to those of gas and electrical grill-cooked. (Choi, 2016).

Table 1.1: Charcoal, Gas and electric Barbeque Grill Shipments (North US)

Year	Charcoal	Gas	Electric
2010	6,232,500	8,553,500	276,600
2011	6,047,000	8,445,000	288,000
2012	5,917,000	8,200,000	280,000
2013	5,590,000	8,053,000	302,000

Therefore, the charcoal grill need to be improvised by providing a simple and easy to use device that generates an airflow that travels through the charcoals, allowing accelerated ignition and heating of the charcoal without creating potential contaminants or blowing ashes into the cooking food.

From the literature and market studies, gas and electric grills are not new after the charcoal grill. However, this study will focus on the improvement of charcoal grill in specific. Thus, the objective of this study is to develop a prototype of Charcoal Barbeque with Air Ventilation System. In the project development, few aspects have to be considered such as the compatibility of the design with semi-auto portable concept, the air ventilation system at which the device is able to be produce and recycle heat, and the quality of barbecuing in aspect of environmental. The proposed barbeque set will enable the users to improve energy, time consumption, environmental friendly and user safety. Lastly, the most important feature will be quality of barbequing with ease of use.

1.1 Problem Statement

Barbecue grills set have gained in popularity in recent years, grill manufacturers are continually striving to develop barbecue grill that will safely and efficiently cook meat or other foods while retaining the natural flavor of the food being cooked. Conventional charcoal barbeque has low energy efficiency and produce smoke emission. It requires longer times to produce heat and low in heat distribution.

The invention of gas and electric barbeque getting more popular over conventional barbecue. However, most gas and electric barbeque are non-flexible for indoor and outdoor usage. Furthermore, gas and electric grills were designed with attached permanent briquettes (Figure 1.2) to replace conventional grills which use combustible charcoal briquettes. Nevertheless, the permanent briquettes associated with current gas and electric grills have a tendency to collect grease from food being cooked and thereby provide a cooking environment very susceptible to unwanted flaming which can burn and dry out meats or other foods being cooked.

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